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# BHCTP Monthly Discharge Monitoring Report

| | | |
|---|---|---|
| Month: | September-17 | |
| Facility: | Central Treatment Plant | |
| Location: | Bunker Hill Superfund Site | |
| Contract Number: | W912DW-16-C-0012 | Amec Foster Wheeler |

| | | |
|---|---|---|
| Total Flow For The Month From 006 Outfall: | 65,867,700 | gallons |
| Sludge pumping to CIA sludge pond: | 1,965,000 | gallons |
| Total Flow From Kellogg Tunnel: | 67,447,510 | gallons |

Percent of Influent Successfully Treated: 100.0%

13 sample days * 6 parameters (Pb, Cd, Zn, Mn, TSS & pH) = 78 potential exceedances
**78 - 0 exceedances = 78 78/78 = 100%**

Results of Sampling Efforts:

All sampling has been performed in accordance with specifications and the Sampling and Analysis Plan.

Performance Evaluation (PE) sampling was not performed for this reporting period.

Trip blank and rinsate sampling was performed, with the results being reported on the 'PTM-004,RB,TB' page of this DMR.

Highlights of Plant Maintenance and/or Plant Optimization:

**09-01-17** Performed monthly fire extinguisher inspection. All CTP fire extinguishers are fully charged and in good working condition at this time.

**09-01-17** Performed monthly pump and motor inspection. All CTP pumps and motors are in good condition at this time.

**09-05-17** Terragraphics reported a total of 400 gallons of well development purge water was disposed of at the lined storage pond. The repository well development project was performed for the CDA Trust.

**09-06-17** 17:55 Operator responded to a low pH auto-dialer alarm. The mine pool pump activation caused a low pH alarm. The mine pool pump increased the flow from 760 gpm to approximately 2020 gpm. Mine personnel provided pump activation notice to the CTP operators at 16:00. The mine pool pump rate is estimated at 1260 gpm at this time. The CTP operating set point was reduced from 8.50 to 8.40 after the influent flow stabilized at 2020 gpm.

**09-07-17** 10:45 KT flow decreased from 2020 gpm to approximately 1895 gpm. Operators verified the KT flow at the flume to be 1895 gpm. The mine pool pump is estimated to be pumping 1135 gpm at this time.

**09-07-17** The second lime silo A dust collection system motor was installed and tested. This second motor failed to operate 50% of the time. The manufacturer was contacted as this is the same issue motor #1 experienced.
Motor #1 was sent to the manufacturer for testing. Discrepancy report #011 completion report is pending.

**09-12-17** Operators installed new drive belts on the Clarifier drive units. 4 new drive belts were ordered to replenish critical use inventory items.

**09-12-17** Operators performed the monthly no load emergency generator run test. The emergency generator operated for thirty minutes as programmed with no issues or errors to report.

**09-14-17** Operators performed the annual emergency generator maintenance. Operators changed the oil and filters on the 750 KW generator. The generator was run tested and placed back into service with no issues.

**09-14-17** Operators performed the requested Polishing Pond sludge sampling. Sample activity was noted in the field log

and corresponding daily QC report.

**09-14-17** Received 38.0 tons of 3/8" minus pebble lime from Pete Lien & Sons. Placed into lime silo A.

**09-21-17** Placed 100 gallons of fuel into the 750 KW emergency generator. Fuel level is slightly over 50% at this time. Fuel capacity of the generator is 1200 gallons.

**09-22-17** Placed 200 gallons of fuel into the 750 KW emergency generator. Fuel level is approximately 75% at this time. Fuel capacity of the generator is 1200 gallons.

**09-22-17** LWTPO was requested to meet with the city sewer contractor in regards to future sewer work near the CTP entrance gate. Future sewer work may interrupt CTP site sewer discharge. The sewer contractor will provide notification of sewer interruption to the CTP LWTPO.

**09-25-17** Received 39.0 tons of 3/8" minus pebble lime from Pete Lien & Sons. Placed into lime silo A.

**09-25-17** DG&S removed several IDEQ manholes and pipes from the CTP site. DG&S also took possession of unused Schlepp project pump. The pump and pipe items were removed from the CTP/Government inventory list.

**09-26-17** Operators performed the monthly full load emergency generator run test. The emergency generator operated all CTP components for one hour as programmed with no issues or errors to report.

**09-26-17** Electrician performed electrical connection of the lime silo A dust collection system motor. The electrician determined the motor is performing the same as the last two motors. The manufacture has been contacted.

**09-26-17** 12:00 Initiated the Nalco flocculant test under the direction of Amec F.W.

**09-28-17** 07:30 Flocculant injection increased from 2.10 ppm to 3.60 ppm as directed to begin wasting the Nalco flocculant. Flocculant test has been abandoned due to Clarifier discharge turbidity of 7.62 ntu.

**09-30-17** Performed monthly reset of the KT and treated outfall flow meters. Documented monthly totals on the KT & 006 flow page of this report.

- The Kellogg Tunnel discharge flow increased by 30% from September 2016, from 49.7 mg to 67.4 mg.

- The Kellogg Tunnel zinc concentration increased by 9% from September 2016, from an average of 68 mg/L to 75 mg/L.

- The CTP operating pH set point was increased from 8.4 to 8.6 briefly during this reporting period.

- The flocculent dosage remained at approximately 1.5 PPM during this reporting period.

- The CTP sludge recycle rate remained at 400 gpm.

- CTP operators received no off-shift auto dialer call-out alarms.

- CTP operators performed no pumping events from the Lined Pond.

- CTP operators verified Aeration Basin pH probe and grab sample values twice per day.

- CTP operators performed daily inspections of the lime slurry holding tank, with no leaks or increased corrosion found this month.

No significant lessons to report for last month.

Lessons Learned

| MONITORING PERIOD | | | | | |
|---|---|---|---|---|---|
| YEAR | MO | DAY | YEAR | MO | DAY |
| 2017 | 9 | 1 | 2017 | 9 | 30 |

| PARAMETER | | Quantity or Loading | | | Quality or Concentration | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | MONTHLY AVERAGE | DAILY MAXIMUM | UNITS | MINIMUM | MONTHLY AVERAGE | DAILY MAXIMUM | UNITS | FREQUENCY OF ANALYSIS | SAMPLE TYPE |
| pH | Sample Measurement | | | | 6.95 | | 7.17 | | Continuous | Meter |
| | Permit Required | | | | 6.0 | | 10.0 | | | |
| Flow Thru Treatment Plant | Sample Measurement | 2.20 | 2.68 | mgd | | | | | | |
| | Permit Required | | Daily | | | | | | | |
| Lead Total - Pb Effluent | Sample Measurement | 0.05 | 0.10 | lbs/day | | 0.003 | 0.004 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 14.8 | 37.0 | | | 0.30 | 0.60 | mg/L | | |
| Zinc Total - Zn Effluent | Sample Measurement | 4.24 | 9.37 | lbs/day | | 0.23 | 0.42 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 36.2 | 91.3 | | | 0.73 | 1.48 | mg/L | | |
| Cadmium - Cd Effluent | Sample Measurement | 0.08 | 0.157 | lbs/day | | 0.004 | 0.007 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 2.40 | 6.10 | | | 0.050 | 0.100 | mg/L | | |
| Manganese - Mn Effluent | Sample Measurement | 438 | 718 | lbs/day | | 9.6 | 33.2 | mg/L | three samples/ week | Comp 24 |
| | No Permit Required | | | | | N/A | N/A | mg/L | | |
| Total Suspended Solids - TSS | Sample Measurement | 15.7 | 41 | lbs/day | | 0.8 | 2.0 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 985 | 1907 | | | 20 | 30 | mg/L | | |

PREPARED BY: GARY FULTON

REVIEWED BY: BRIAN JOHNSON

**NPDES DISCHARGE POINT 006**
**CENTRAL TREATMENT PLANT**
**MONTH: Sep-17**

| DAY | LEAD (Pb) | | ZINC (Zn) | | CADMIUM (Cd) | | MANGANESE (Mn) | | pH | FLOW | TSS | | LOADING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | | mgd | mg/L | lbs/day | kg/day |
| 1 | 0.0026 | 0.024 | 0.262 | 2.43 | 0.0038 | 0.04 | 0.901 | 8.35 | 6.95 | 1.11 | 0.40 | 3.71 | 1.68 |
| 2 | | 0.023 | | 2.36 | | 0.03 | | 8.12 | | 1.08 | | 3.61 | 1.63 |
| 3 | | 0.023 | | 2.37 | | 0.03 | | 8.14 | | 1.08 | | 3.61 | 1.64 |
| 4 | 0.0026 | 0.023 | 0.282 | 2.53 | 0.0045 | 0.04 | 0.983 | 8.83 | 7.16 | 1.08 | 0.60 | 5.39 | 2.44 |
| 5 | | 0.023 | | 2.49 | | 0.04 | | 8.70 | | 1.06 | | 5.31 | 2.41 |
| 6 | 0.0026 | 0.024 | 0.313 | 2.84 | 0.0049 | 0.04 | 1.11 | 10.1 | 7.15 | 1.09 | 0.20 | 1.81 | 0.82 |
| 7 | | 0.043 | | 5.12 | | 0.08 | | 18.2 | | 1.96 | | 3.27 | 1.48 |
| 8 | 0.0026 | 0.058 | 0.419 | 9.37 | 0.0070 | 0.16 | 8.28 | 185 | 7.16 | 2.68 | 0.40 | 8.95 | 4.06 |
| 9 | | 0.058 | | 9.30 | | 0.16 | | 184 | | 2.66 | | 8.88 | 4.03 |
| 10 | | 0.055 | | 8.94 | | 0.15 | | 177 | | 2.56 | | 8.54 | 3.87 |
| 11 | 0.0030 | 0.062 | 0.260 | 5.36 | 0.0060 | 0.12 | 32.6 | 672 | 6.97 | 2.47 | 0.60 | 12.4 | 5.61 |
| 12 | | 0.063 | | 5.47 | | 0.13 | | 686 | | 2.52 | | 12.6 | 5.72 |
| 13 | 0.0026 | 0.054 | 0.203 | 4.19 | 0.0046 | 0.10 | 30.7 | 634 | 7.17 | 2.48 | 2.00 | 41.3 | 18.7 |
| 14 | | 0.051 | | 4.00 | | 0.09 | | 605 | | 2.36 | | 39.4 | 17.9 |
| 15 | 0.0026 | 0.056 | 0.170 | 3.69 | 0.0037 | 0.08 | 25.3 | 549 | 7.05 | 2.60 | 1.20 | 26.0 | 11.8 |
| 16 | | 0.056 | | 3.65 | | 0.08 | | 543 | | 2.57 | | 25.7 | 11.7 |
| 17 | | 0.055 | | 3.62 | | 0.08 | | 538 | | 2.55 | | 25.5 | 11.6 |
| 18 | 0.0044 | 0.091 | 0.173 | 3.57 | 0.0045 | 0.09 | 32.6 | 672 | 7.02 | 2.47 | 0.80 | 16.5 | 7.48 |
| 19 | | 0.097 | | 3.81 | | 0.10 | | 718 | | 2.64 | | 17.6 | 7.99 |
| 20 | 0.0037 | 0.079 | 0.166 | 3.55 | 0.0041 | 0.09 | 30.3 | 647 | 7.00 | 2.56 | 0.60 | 12.8 | 5.81 |
| 21 | | 0.072 | | 3.23 | | 0.08 | | 589 | | 2.33 | | 11.7 | 5.29 |
| 22 | 0.0026 | 0.055 | 0.153 | 3.22 | 0.0039 | 0.08 | 28.3 | 595 | 7.02 | 2.52 | 0.40 | 8.41 | 3.81 |
| 23 | | 0.056 | | 3.27 | | 0.08 | | 605 | | 2.56 | | 8.55 | 3.88 |
| 24 | | 0.054 | | 3.19 | | 0.08 | | 590 | | 2.50 | | 8.34 | 3.78 |
| 25 | 0.0026 | 0.053 | 0.170 | 3.45 | 0.0037 | 0.08 | 33.2 | 674 | 6.98 | 2.43 | 0.60 | 12.2 | 5.53 |
| 26 | | 0.053 | | 3.46 | | 0.08 | | 676 | | 2.44 | | 12.2 | 5.54 |
| 27 | 0.0026 | 0.052 | 0.173 | 3.48 | 0.0037 | 0.07 | 31.5 | 634 | 7.02 | 2.41 | 1.20 | 24.1 | 10.9 |
| 28 | | 0.054 | | 3.57 | | 0.08 | | 649 | | 2.47 | | 24.7 | 11.2 |
| 29 | 0.0026 | 0.053 | 0.305 | 6.21 | 0.0040 | 0.08 | 31.9 | 650 | 7.00 | 2.44 | 2.00 | 40.7 | 18.5 |
| 30 | | 0.048 | | 5.60 | | 0.07 | | 586 | | 2.20 | | 36.7 | 16.7 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | 0.0371 | 1.57 | 3.05 | 127 | 0.0584 | 2.51 | 288 | 13,126 | 91.7 | 65.9 | 11.0 | 471 | 213 |
| Sample Events | 13 | 30 | 13 | 30 | 13 | 30 | 30 | 30 | 13 | 30 | 13 | 30 | 30 |
| Daily Average | 0.003 | 0.052 | 0.235 | 4.24 | 0.004 | 0.084 | 9.6 | 438 | 7.05 | 2.20 | 0.85 | 15.7 | 7.12 |
| Lab Detection Limit | **0.0026** | | **0.004** | | **0.0004** | | **0.0025** | | **0.01** | | **0.800** | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MIN | 0.003 | 0.023 | 0.153 | 2.361 | 0.004 | 0.034 | 0.901 | 8.120 | 6.950 | 1.060 | 0.200 | 1.814 | 0.823 |
| MAX | 0.004 | 0.097 | 0.419 | 9.371 | 0.007 | 0.157 | 33.200 | 718.204 | 7.170 | 2.680 | 2.000 | 41.326 | 18.742 |

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) in lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) in kg/day
*verified by Brian Johnson, 10/12/17*

**KELLOGG TUNNEL DISCHARGE**
**CENTRAL TREATMENT PLANT**
**MONTH: Sep-17**
**Data from SVL**

| DAY | LEAD (Pb) | | ZINC (Zn) | | CADMIUM (Cd) | | MANGANESE (Mn) | | pH s.u. | 006 FLOW | TSS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | ***SVL Lab*** | mgd | mg/L | lbs/day | kg/day |
| 1 | | 5.33 | | 1,093 | | 2.22 | | 337.2 | | 1.11 | | 361.3 | 163.8 |
| 2 | | 5.18 | | 1,063 | | 2.16 | | 328.1 | | 1.08 | | 351.5 | 159.4 |
| 3 | | 5.20 | | 1,066 | | 2.17 | | 328.9 | | 1.08 | | 352.4 | 159.8 |
| 4 | 0.575 | 5.17 | 118 | 1,060 | 0.240 | 2.16 | 36.4 | 327.1 | 2.82 | 1.08 | 39 | 350.4 | 158.9 |
| 5 | | 5.09 | | 1,044 | | 2.12 | | 322.0 | | 1.06 | | 345.0 | 156.5 |
| 6 | | 5.22 | | 1,070 | | 2.18 | | 330.2 | | 1.09 | | 353.8 | 160.4 |
| 7 | 2.530 | 41.38 | 71.9 | 1,176 | 0.108 | 1.77 | 114 | 1,865 | 3.06 | 1.96 | 431 | 7050 | 3197 |
| 8 | | 56.58 | | 1,608 | | 2.42 | | 2,550 | | 2.68 | | 9639 | 4371 |
| 9 | | 56.16 | | 1,596 | | 2.40 | | 2,531 | | 2.66 | | 9567 | 4339 |
| 10 | | 53.99 | | 1,534 | | 2.30 | | 2,433 | | 2.56 | | 9197 | 4171 |
| 11 | 0.664 | 13.68 | 68.9 | 1,420 | 0.106 | 2.18 | 111 | 2,287 | 3.12 | 2.47 | 96 | 1978 | 897.0 |
| 12 | | 13.96 | | 1,449 | | 2.23 | | 2,334 | | 2.52 | | 2019 | 915.6 |
| 13 | | 13.72 | | 1,424 | | 2.19 | | 2,294 | | 2.48 | | 1984 | 899.6 |
| 14 | 0.663 | 13.06 | 69.4 | 1,367 | 0.106 | 2.09 | 112 | 2,206 | 3.21 | 2.36 | 86 | 1694 | 768.1 |
| 15 | | 14.39 | | 1,506 | | 2.30 | | 2,430 | | 2.60 | | 1866 | 846.2 |
| 16 | | 14.22 | | 1,488 | | 2.27 | | 2,402 | | 2.57 | | 1844 | 836.5 |
| 17 | | 14.10 | | 1,476 | | 2.25 | | 2,382 | | 2.55 | | 1829 | 829.4 |
| 18 | 0.622 | 12.82 | 68.5 | 1,412 | 0.102 | 2.10 | 108 | 2,226 | 3.23 | 2.47 | 96 | 1979 | 897.4 |
| 19 | | 13.70 | | 1,509 | | 2.25 | | 2,379 | | 2.64 | | 2115 | 959.2 |
| 20 | | 13.29 | | 1,463 | | 2.18 | | 2,307 | | 2.56 | | 2051 | 930.1 |
| 21 | 0.633 | 12.31 | 68.9 | 1,340 | 0.100 | 1.94 | 110 | 2,139 | 3.30 | 2.33 | 81 | 1575 | 714.3 |
| 22 | | 13.31 | | 1,449 | | 2.10 | | 2,313 | | 2.52 | | 1703 | 772.5 |
| 23 | | 13.52 | | 1,472 | | 2.14 | | 2,350 | | 2.56 | | 1730 | 784.8 |
| 24 | | 13.20 | | 1,437 | | 2.08 | | 2,293 | | 2.50 | | 1689 | 765.9 |
| 25 | 0.626 | 12.72 | 64.9 | 1,318 | 0.0983 | 2.00 | 105 | 2,132.7 | 3.17 | 2.43 | 96 | 1949.9 | 884.3 |
| 26 | | 12.75 | | 1,321 | | 2.00 | | 2,138.0 | | 2.44 | | 1954.7 | 886.5 |
| 27 | | 12.59 | | 1,305 | | 1.98 | | 2,111.7 | | 2.41 | | 1930.7 | 875.6 |
| 28 | 0.656 | 13.52 | 66.9 | 1,379 | 0.0970 | 2.00 | 107 | 2,205.5 | 3.24 | 2.47 | 92 | 1896.3 | 860.0 |
| 29 | | 13.36 | | 1,362 | | 1.98 | | 2,178.7 | | 2.44 | | 1873.3 | 849.6 |
| 30 | | 12.04 | | 1,228 | | 1.78 | | 1,964.4 | | 2.20 | | 1689.0 | 766.0 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Total | 6.97 | 506 | 597 | 40,436 | 1 | 64 | 803 | 56,424 | 25 | 66 | 1,017 | 74,916 | 33,976 |
| Sample Events | 8 | 30 | 8 | 30 | 8 | 30 | 8 | 30 | 8 | 30 | 8 | 30 | 30 |
| Daily Average | 0.871 | 16.9 | 74.7 | 1,348 | 0.120 | 2.13 | 100.4 | 1,881 | 3.14 | 2.20 | 127 | 2497 | 1133 |

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) kg/day
*verified by Brian Johnson, 10/12/17*

**PTM Effluent at Lined Storage Pond** **Month: Sep-17**
**CENTRAL TREATMENT PLANT**

| DATE | LEAD mg/L | ZINC mg/L | CADMIUM mg/L | pH s.u. CTP Lab | TSS mg/L |
|---|---|---|---|---|---|
| 09/07/17 | 0.0026 | 10.7 | 1.36 | 6.78 | 0.4 |
| | | | | | |
| 09/21/17 | 0.0026 | 9.56 | 1.24 | 6.73 | 0.4 |
| | | | | | |
| | | | | | |

**RINSATE AND TRIP BLANKS** **Month: Sep-17**
**CENTRAL TREATMENT PLANT**

**Rinsate and Trip Blank samples will be taken approximately every 20 QC events, or one each per month.**

| LOCATION Rinsate & Trip Blank | DATE | SAMPLE | LEAD mg/L | ZINC mg/L | CADMIUM mg/L |
|---|---|---|---|---|---|
| Kellogg tunnel Discharge | | RB-09-11-17 | <0.008 | <0.010 | <0.002 |
| Trip Blank (D.I.water) | | TB-09-11-17 | <0.008 | <0.010 | <0.002 |

*verified by Brian Johnson, 10/12/17*

**CENTRAL TREATMENT PLANT** **MISCELLANEOUS FLOWS**

**Month :** **Sep-17**

| Date | **KT Flow Meter Reading** |
|---|---|
| **8/31/2017** | 0 |
| **9/30/2017** | 67,447,510 |
| **Total** | 67,447,510 |

| Date | **006 Flow Meter Reading** |
|---|---|
| **8/31/2017** | 0 |
| **9/30/2017** | 65,867,700 |
| **Total** | 65,867,700 |

**Lined Storage Pond Influent Flows**

**Sweeny Pump Station Reading**

| Date | #1 Pump | 620 gpm | #2 Pump | 500 gpm |
|---|---|---|---|---|
| **8/31/2017** | 170.0 | Hours | 785.0 | Hours |
| **9/30/2017** | 170.0 | Hours | 785.0 | Hours |
| Total Hours | 0.0 | Hours | 0.0 | Hours |
| Total Flow for 004/Sweeny For The Month = | | | 0 | Gallons |

**PTM Discharge Flow**

| Date | Flow (gpm) |
|---|---|
| 09/07/17 | 7.0 |
| 09/12/17 | 7.5 |

| Date | **Lined Storage Pond Water Level** | | | |
|---|---|---|---|---|
| **8/31/2017** | 750,000 | gal | Elev. = | 2268.5 |
| **9/30/2017** | 750,000 | gal | Elev. = | 2268.5 |

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**Old Mine Line Discharge Flow**

| Date | Flow (gpm) |
|---|---|
| NA | NA |

# Bunker Hill Central Treatment Plant

## Daily log September 2017

| | | | | AERATION BASIN | | | | | CLARIFIER | | | | | | DISCHARGE 006 | | | | | | | | RECYCLE SG | | LIME SLURRY | | | SLUDGE PUMP | | POND PUMP | | SLUDGE GUN TEST | | LINED POND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INFLUENT KT | | | a.m. | | p.m. | | a.m. | | p.m. | | | | a.m. | | p.m. | | DO | 1/wk | | | | | | | Injection Valve | Est. | 600gpm | | | | | ESTIMATED |
| DATE | Operators | GPM | pH | SET | pH1 | grab | pH1 | grab | pH2 | grab | pH2 | grab | TURB | TEMP | pH3 | grab | pH3 | grab | PPM | TEMP | TURB | FLOW | SG | GPM | SG | %solid | Closed/Open | pump # | min | ON | OFF | 10' Out | 20' Out | Elevation (mg) |
| 9/1 | GC | | | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.3 | 8.3 | 8.4 | 8.3 | 0.40 | 53 | 7.1 | 7.3 | 7.0 | 7.1 | | | 0.38 | 1.11 | 1.040 | 400 | 1.064 | 10.0 | 262/25 | 3 | 60 | | | | | 2268.5 (.75mg) |
| 9/2 | GC | | | 8.5 | 8.4 | 8.4 | 8.6 | 8.6 | 8.3 | 8.2 | 8.3 | 8.2 | 0.42 | 54 | 7.1 | 7.2 | 7.1 | 7.2 | | | 0.41 | 1.08 | 1.037 | 400 | 1.066 | 10.2 | 264/25 | 3 | 60 | | | | | 2268.5 |
| 9/3 | SB | | | 8.5 | 8.5 | 8.6 | 8.6 | 8.6 | 8.3 | 8.2 | 8.5 | 8.3 | 0.50 | 53 | 7.0 | 7.3 | 7.3 | 7.4 | | | 0.41 | 1.08 | 1.037 | 400 | 1.065 | 10.1 | 221/25 | 3 | 60 | | | | | 2268.5 |
| 9/4 | SB | 757 | 2.86 | 8.5 | 8.6 | 8.7 | 8.5 | 8.6 | 8.3 | 8.3 | 8.2 | 8.3 | 0.50 | 53 | 7.0 | 7.3 | 7.0 | 7.3 | | | 0.46 | 1.08 | 1.034 | 400 | 1.065 | 10.1 | 243/25 | 3 | 60 | | | | | 2268.5 |
| 9/5 | GF,SB,GC | | | 8.5 | 8.5 | 8.5 | 8.6 | 8.5 | 8.2 | 8.6 | 8.3 | 8.2 | 0.40 | 54 | 7.0 | 7.3 | 6.9 | 7.1 | | | 0.30 | 1.06 | 1.037 | 400 | 1.064 | 10.0 | 275/25 | 3 | 60 | | | | | 2268.5 |
| 9/6 | GF,SB,GC | | | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.1 | 7.9 | 8.2 | 8.1 | 0.46 | 55 | 6.9 | 7.3 | 7.0 | 7.2 | 10.0 | 6.8 | 0.38 | 1.09 | 1.039 | 400 | 1.063 | 9.8 | 238/25 | 3 | 60 | | | | | 2268.5 |
| 9/7 | GF,SB,GC | 1895 | 2.85 | 8.4 | 8.4 | 8.4 | 8.5 | 8.6 | 8.2 | 8.1 | 8.2 | 7.9 | 0.42 | 53 | 7.0 | 7.4 | 7.2 | 7.2 | | | 0.38 | 1.96 | 1.056 | 400 | 1.064 | 10.0 | 114/35 | 3 | 120 | | | | | 2268.5 |
| 9/8 | GF,GC | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.3 | 8.2 | 8.3 | 8.1 | 0.70 | 57 | 7.1 | 7.4 | 7.3 | 7.3 | | | 0.46 | 2.68 | 1.059 | 400 | 1.064 | 10.0 | 157/35 | 3 | 120 | | | | | 2268.5 |
| 9/9 | GC | | | 8.4 | 8.4 | 8.3 | 8.4 | 8.4 | 8.2 | 8.0 | 8.4 | 8.0 | 0.92 | 56 | 7.1 | 7.3 | 7.5 | 7.4 | | | 0.70 | 2.66 | 1.056 | 400 | 1.064 | 10.0 | 168/35 | 3 | 120 | | | 10'-12" | 20'-9" | 2268.5 |
| 9/10 | SB | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.3 | 8.0 | 8.4 | 8.1 | 1.04 | 55 | 7.1 | 7.2 | 7.5 | 7.4 | | | 0.98 | 2.56 | 1.052 | 400 | 1.064 | 10.0 | 158/35 | 3 | 120 | | | | | 2268.5 |
| 9/11 | GF,SB | 1835 | 2.90 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.3 | 8.2 | 8.2 | 8.0 | 1.30 | 57 | 7.3 | 7.3 | 7.4 | 7.3 | | | 1.18 | 2.47 | 1.057 | 400 | 1.063 | 9.8 | 156/35 | 3 | 120 | | | | | 2268.5 |
| 9/12 | GF,SB,GC | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.5 | 8.3 | 8.1 | 8.4 | 8.1 | 1.43 | 61 | 7.3 | 7.5 | 7.5 | 7.4 | | | 1.52 | 2.52 | 1.053 | 400 | 1.064 | 10.0 | 153/35 | 3 | 120 | | | | | 2265.5 |
| 9/13 | GF,SB,GC | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.5 | 8.2 | 8.2 | 8.4 | 8.0 | 1.46 | 57 | 7.3 | 7.2 | 7.4 | 7.2 | 9.74 | 7.0 | 1.23 | 2.48 | 1.053 | 400 | 1.065 | 10.1 | 153/35 | 3 | 120 | | | | | 2268.5 |
| 9/14 | GF,SB,GC | 1895 | 2.90 | 8.4 | 8.5 | 8.6 | 8.4 | 8.4 | 8.4 | 8.2 | 8.5 | 8.1 | 1.46 | 56 | 7.4 | 7.5 | 7.4 | 7.4 | | | 1.56 | 2.36 | 1.052 | 400 | 1.065 | 10.1 | 160/35 | 3 | 120 | | | | | 2268.5 |
| 9/15 | GF,GC | | | 8.4 | 8.4 | 8.5 | 8.4 | 8.4 | 8.7 | 8.2 | 8.0 | 8.1 | 1.35 | 54 | 7.5 | 7.2 | 7.2 | 7.1 | | | 1.27 | 2.60 | 1.053 | 400 | 1.066 | 10.2 | 163/35 | 3 | 150 | | | | | 2268.5 |
| 9/16 | GC | | | 8.5 | 8.4 | 8.4 | 8.4 | 8.4 | 8.0 | 8.0 | 7.8 | 7.8 | 1.45 | 53 | 7.5 | 7.5 | 7.5 | 7.3 | | | 1.44 | 2.57 | 1.050 | 400 | 1.064 | 10.0 | 160/35 | 3 | 120 | | | | | 2268.5 |
| 9/17 | SB | | | 8.4 | 8.5 | 8.5 | 8.5 | 8.5 | 7.9 | 7.9 | 7.9 | 7.9 | 1.53 | 53 | 7.5 | 7.3 | 7.6 | 7.3 | | | 1.41 | 2.55 | 1.050 | 400 | 1.065 | 10.1 | 167/35 | 3 | 120 | | | | | 2268.5 |
| 9/18 | GF,SB | 1875 | 3.09 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 7.9 | 8.0 | 7.9 | 7.9 | 1.50 | 54 | 7.4 | 7.4 | 7.6 | 7.4 | | | 1.40 | 2.47 | 1.051 | 400 | 1.066 | 10.2 | 171/35 | 3 | 120 | | | | | 2268.5 |
| 9/19 | GF,SB,GC | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.0 | 7.9 | 7.9 | 7.9 | 1.48 | 52 | 7.5 | 7.3 | 7.6 | 7.3 | | | 1.48 | 2.64 | 1.052 | 400 | 1.065 | 10.1 | 166/35 | 3 | 120 | | | | | 2268.5 |
| 9/20 | GF,SB,GC | | | 8.4 | 8.4 | 8.4 | 8.6 | 8.6 | 8.0 | 7.9 | 7.9 | 7.8 | 1.38 | 53 | 7.4 | 7.0 | 7.6 | 7.2 | 9.84 | 6.9c | 1.37 | 2.56 | 1.057 | 400 | 1.065 | 10.1 | 164/35 | 3 | 120 | | | | | 2269.0 (1.0mg) |
| 9/21 | GF,SB,GC | 1812 | 3.18 | 8.4 | 8.5 | 8.6 | 8.4 | 8.4 | 8.0 | 7.9 | 8.0 | 7.7 | 1.32 | 52 | 7.6 | 7.2 | 7.8 | 7.4 | | | 1.25 | 2.33 | 1.052 | 400 | 1.066 | 10.2 | 153/35 | 3 | 120 | | | | | 2269.0 |
| 9/22 | GF,GC | | | 8.4 | 8.4 | 8.4 | 8.5 | 8.4 | 8.0 | 8.0 | 8.1 | 8.0 | 1.25 | 50 | 8.0 | 7.2 | 8.0 | 7.2 | | | 1.31 | 2.52 | 1.056 | 400 | 1.065 | 10.1 | 166/35 | 3 | 120 | | | | | 2269.0 |
| 9/23 | GC | | | 8.4 | 8.4 | 8.5 | 8.5 | 8.5 | 8.0 | 8.0 | 8.0 | 8.0 | 1.34 | 54 | 8.0 | 7.3 | 7.9 | 7.3 | | | 1.15 | 2.56 | 1.053 | 400 | 1.063 | 9.8 | 157/35 | 3 | 120 | | | | | 2269.0 |
| 9/24 | SB | | | 8.4 | 8.4 | 8.5 | 8.4 | 8.4 | 8.0 | 8.0 | 7.9 | 7.8 | 1.48 | 55 | 8.0 | 7.3 | 7.9 | 7.3 | | | 1.35 | 2.50 | 1.050 | 400 | 1.062 | 9.7 | 163/35 | 3 | 120 | | | | | 2269.0 |
| 9/25 | GF,GC | 1810 | 3.20 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 7.9 | 8.0 | 7.9 | 7.9 | 1.55 | 54 | 7.6 | 7.2 | 8.0 | 7.3 | | | 1.22 | 2.43 | 1.050 | 400 | 1.064 | 10.0 | 167/35 | 3 | 120 | | | | | 2269.0 |
| 9/26 | GF,SB,GC | | | 8.4 | 8.4 | 8.4 | 8.4 | 8.5 | 7.9 | 8.0 | 7.9 | 7.8 | 1.23 | 54 | 7.9 | 7.3 | 7.8 | 7.2 | | | 1.34 | 2.44 | 1.048 | 400 | 1.065 | 10.1 | 172/35 | 3 | 120 | | | | | 2269.0 |
| 9/27 | GF,SB,GC | | | 8.4 | 8.4 | 8.5 | 8.4 | 8.4 | 8.0 | 8.1 | 7.9 | 7.9 | 3.00 | 53 | 7.9 | 7.3 | 7.9 | 7.3 | 9.62 | 7.5c | 2.39 | 2.41 | 1.059 | 400 | 1.067 | 10.4 | 170/35 | 3 | 120 | | | 10'-12" | 20'-11" | 2269.0 |
| 9/28 | GF,SB,GC | 1805 | 3.00 | 8.6 | 8.4 | 8.5 | 8.6 | 8.6 | 7.9 | 8.0 | 7.7 | 7.8 | 7.62 | 56 | 7.9 | 7.0 | 7.9 | 7.2 | | | 4.00 | 2.47 | 1.051 | 400 | 1.065 | 10.1 | 171/35 | 3 | 125 | | | | | 2269.0 |
| 9/29 | GF,GC | | | 8.6 | 8.6 | 8.6 | 8.7 | 8.7 | 8.0 | 8.0 | 7.7 | 7.8 | 7.83 | 57 | 7.7 | 7.1 | 7.7 | 7.0 | | | 6.10 | 2.44 | 1.041 | 400 | 1.068 | 10.5 | 146/35 | 3 | 90 | | | 10'-8" | 20'-8" | 2269.0 |
| 9/30 | GC | | | 8.5 | 8.5 | 8.5 | 8.4 | 8.4 | 7.8 | 7.9 | 7.8 | 7.9 | 4.30 | 56 | 7.6 | 7.5 | 7.6 | 7.4 | | | 4.35 | 2.20 | 1.054 | 400 | 1.065 | 10.1 | 150/35 | 3 | 150 | | | | | 2269.0 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 1/wk | 1/wk | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Averages: | | | | 8.44 | 8.44 | 8.46 | 8.46 | 8.46 | 8.12 | 8.07 | 8.10 | 7.99 | **1.70** | 54.47 | 7.42 | 7.28 | 7.50 | 7.27 | PPM | *c | 1.44 | 2.20 | 1.05 | | | | | | 109 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Notes:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3275 | | | | | |
| | 09-06-17 17:55 Operator responded to auto-dialer call out. KT flow increased from 760 gpm to approximately 2020 gpm, (1260 gpm pump). PH set point decreased from 8.50 to 8.40. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1,965,000 | Gallons | | | | |
| | 09-07-17 10:45 KT flow decreased from approximately 2020 gpm to 1895 gpm. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-09-17 06:30 Recalibrated Aeration Basin pH probe to sample grab. 8.41 to 8.31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-13-17 12:00 KT flow decreased from approximately 1835 gpm to approximately 750 gpm. pH set point increased to 8.50 from 8.40 - low flow duration is unknown. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-13-17 17:00 KT flow increased from approximately 750 gpm to approximately 1895 gpm. pH set point was decreased from 8.50 to 8.40. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-15-17 08:30 Calibrated the Clarifier and Treated Outfall pH probes in an attempt to correct calibration drifting. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-20-17 10:30 KT flow decreased from approximately 1875 to approximately 750 gpm. Increased pH set point from 8.4 to 8.5 during the low flow period. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-20-17 13:30 KT flow increased from approximately 750 gpm to 1812 gpm. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-28-17 08:20 Increased pH set point to 8.60 from 8.40 to aid in metals precipitation in the high turbidity process water. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-29-17 08:30 Process pH set point reduced from 8.60 to 8.40. 14:00 Flocculant mixing is 3 ppf, 1.50 pump setting (1.60 PPM). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-29-17 12:00 KT flow decreased to approximately 750 gpm. pH set point increased to 8.50. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 09-29-17 19:00 KT flow increased to approximately 1760 gpm. pH set point was decreased to 8.40 @ 06:00 on 09-30-17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# 2017-May 03 to 2018-May 02 BHCTP LIME USAGE AFW

| | Silo A | | | | | | Silo B | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Net Tons | Tons/Day |
| May 3-May 31 | 16.00 | 16.00 | 0.0 | 0.0 | 0.00 | 0.0 | 14.00 | 7.30 | 6.7 | 36.1 | 183.79 | 219.9 | 219.9 | 7.58 |
| June 1-June 30 | 16.00 | 11.40 | 4.6 | 24.8 | 83.42 | 108.2 | 7.30 | 13.2 | -5.9 | -31.8 | 67.10 | 35.3 | 143.5 | 4.78 |
| July 1-July 31 | 11.40 | 11.00 | 0.4 | 2.2 | 0.00 | 2.2 | 13.20 | 8.50 | 4.7 | 25.3 | 114.10 | 139.4 | 141.6 | 4.57 |
| August 1-August 31 | 11.00 | 15.80 | -4.8 | -25.9 | 40.50 | 14.6 | 8.50 | 16.3 | -7.8 | -42.0 | 115.00 | 73.0 | 87.6 | 2.83 |
| Sept. 1 - Sept 30 | 15.80 | 11.30 | 4.5 | 24.3 | 76.50 | 100.8 | 16.30 | 16.30 | 0.0 | 0.0 | 0.00 | 0.0 | 100.8 | 3.36 |
| Oct. 1 - Oct. 31 | 11.30 | 11.30 | 0.0 | 0.0 | 0.00 | 0.0 | 16.30 | 16.30 | 0.0 | 0.0 | 0.00 | 0.0 | 0.0 | 0.00 |
| | | | | **Silo A** | **200.42** | | | | | **Silo B** | **479.99** | | 693.3 | |
| | | | | | | **Tdl Tons Purchased** | | **680.41** | | | | | **Average** | **4.62** |

NOTES:
May 3, 2017 A= 16.0 B = 14.0 AFW Beginning Levels
01-25-17 Placed slaker/silo B into service, slaker/silo A in six month standby mode.
04-20-17 Placed 4.9 ton into silo A and 31.1 ton into silo B, fill in preparation for contract changeover.
05-23-17 Received the initial Pete Lien & Sons lime delivery of 39.20 tons - Silo B
05-30-17 Received Pete Lien & Sons lime delivery of 37.50 tons - Silo B
06-01-17 Received Pete Lien & Sons lime delivery of 39.0 tons - Silo B
06-04-17 Removed Lime System B (Slaker B) from service and placed Lime System A into service. Lime System B in fail mode (lime feed auger has failed).
06-04-17 12:30 Operator measured the void space in Silo B at 9.0'. The silo B level indicator display reading at this time was 10.7'.
06-06-17 28.1 Tons placed into Silo B, **11.3 Tons placed into Silo A - Silo B Cone/Stack issues prevented loading entire truck into Silo B (15.1 ft)**
06-07-17 11:00 Placed slaker/silo A into service, placed slaker/silo B into standby mode
06-13-17 Drained and cleaned slaker B. 06-14-17 Drained and cleaned slaker A.
06-28-17 08:00 Slaker A removed from service, slaker B placed into service. Operators replaced the #2 lime loop pressure valve rubber body and slaker A drive shaft packing.
07-10-17 06:30 Slaker B removed from service due to a lime feed issue. Slaker A placed into service. Operators will investigate when time allows.
08-09-17 36 Tons placed into Silo B, 2 Tons placed into Silo A
08-22-17 Slaker B (Silo B) removed from service, Slake A (Silo A) placed into service - Six Month Rotation- Lime loop #2 off, Lime loop #1 on -Six Month Rotation-

**Lime Daily Use - 7 Days**

| | Silo A | | | | | | Silo B | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Net Tons | Tons/Day |
| 9/25-10/2 | 13.00 | 8.50 | 4.5 | 24.3 | 0.00 | 24.3 | 16.30 | 16.30 | 0.0 | 0.0 | 0.00 | 0.0 | 24.3 | 3.47 |

**Lime Silo A Depth Readings**

| Date | Prior | After | Tons Received | | Tons/ft |
|---|---|---|---|---|---|
| 6/6/2017 | 14.6 | 16.7 | 11.30 | | 5.38 |
| 6/15/2017 | 9.5 | 14.6 | 36.02 | | 7.06 |
| 6/22/2017 | 10.1 | 15.2 | 36.10 | | 7.08 |
| 8/9/2017 | 11.0 | 11.2 | 2.00 | Estimated | 10.00 |
| 8/28/2017 | 10.1 | 16.0 | 38.50 | | 6.53 |
| 9/14/2017 | 8.7 | 14.6 | 38.00 | | 6.44 |
| 9/25/2017 | 8.0 | 13.5 | 38.50 | | 7.00 |

**Lime Silo B Depth Readings**

| Date | Prior | After | Tons Received | | Tons/ft |
|---|---|---|---|---|---|
| 5/22/2017 | 7.7 | 11.4 | 39.2 | | 10.59 |
| 5/30/2017 | 3.5 | 7.5 | 37.5 | | 9.38 |
| 6/1/2017 | 6.5 | 13.3 | 39.0 | | 5.74 |
| 6/5/2017 | 10.8 | 15.1 | 28.1 | | 6.53 |
| 7/10/2017 | 6.6 | 11.2 | 39.6 | | 8.61 |
| 7/12/2017 | 10.5 | 17.0 | 35.0 | | 5.38 |
| 7/31/2017 | 4.8 | 8.5 | 39.5 | | 10.68 |
| 8/7/2017 | 6.4 | 11.3 | 39.5 | | 8.06 |
| 8/9/2017 | 10.6 | 17.2 | 37.0 | Estimated | 5.61 |
| 8/21/2017 | 10.9 | 16.5 | 38.5 | | 6.88 |

## LIME DEMAND TRACKING

| Year | Month | Lime (tons) | KT flow (mg) | Lime Demand (g/L) | |
|---|---|---|---|---|---|
| 2006 | Jan. | 70.2 | 56.0 | 0.30 | |
| | Feb. | 69.9 | 51.2 | 0.33 | |
| | March | 96.3 | 56.3 | 0.41 | |
| | April | 107.5 | 72.0 | 0.36 | |
| | May | 235.4 | 72.0 | 0.78 | peak |
| | June | 114.6 | 68.3 | 0.40 | |
| | July | 100.4 | 64.0 | 0.38 | |
| | Aug. | 118.2 | 64.1 | 0.44 | |
| | Sept. | 38.4 | 54.5 | 0.17 | |
| | Oct. | 69.5 | 57.6 | 0.29 | |
| | Nov. | 71.3 | 55.2 | 0.31 | |
| | Dec. | 78.2 | 60.5 | 0.31 | |
| 2007 | Jan. | 66.0 | 56.3 | 0.28 | |
| | Feb. | 51.8 | 50.5 | 0.25 | |
| | March | 81.7 | 65.4 | 0.30 | |
| | April | 127.9 | 66.6 | 0.46 | |
| | May | 154.0 | 63.2 | 0.58 | peak |
| | June | 94.1 | 57.9 | 0.39 | |
| | July | 107.0 | 58.3 | 0.44 | |
| | Aug. | 75.8 | 55.3 | 0.33 | |
| | Sept. | 77.2 | 50.5 | 0.37 | |
| | Oct. | 62.3 | 50.1 | 0.30 | |
| | Nov. | 56.9 | 50.8 | 0.27 | |
| | Dec. | 28.1 | 52.0 | 0.13 | |
| 2008 | Jan. | 60.7 | 53.4 | 0.27 | |
| | Feb. | 50.2 | 49.3 | 0.24 | |
| | March | 58.0 | 54.6 | 0.25 | |
| | April | 78.3 | 61.7 | 0.30 | |
| | May | 629.3 | 86.7 | 1.74 | peak |
| | June | 388.1 | 82.6 | 1.13 | |
| | July | 155.6 | 66.3 | 0.56 | |
| | Aug. | 129.5 | 65.2 | 0.48 | |
| | Sept. | 97.2 | 61.1 | 0.38 | |
| | Oct. | 76.4 | 58.7 | 0.31 | |
| | Nov. | 64.9 | 52.0 | 0.30 | |
| | Dec. | 73.0 | 55.7 | 0.31 | |
| 2009 | Jan. | 70.3 | 50.9 | 0.33 | |
| | Feb. | 60.3 | 48.2 | 0.30 | |
| | March | 62.1 | 61.7 | 0.24 | |
| | April | 88.0 | 63.1 | 0.33 | |
| | May | 180.9 | 70.2 | 0.62 | peak |
| | June | 146.3 | 64.6 | 0.54 | |
| | July | 104.4 | 61.6 | 0.41 | |
| | Aug. | 94.8 | 56.4 | 0.40 | |
| | Sept. | 89.2 | 57.0 | 0.38 | |
| | Oct. | 69.4 | 55.8 | 0.30 | |
| | Nov. | 70.9 | 55.0 | 0.31 | |
| | Dec. | 47.4 | 54.5 | 0.21 | |
| 2010 | Jan. | 66.7 | 55.5 | 0.29 | |
| | Feb. | 51.5 | 50.8 | 0.24 | |
| | March | 49.5 | 54.7 | 0.22 | |
| | April | 50.0 | 56.3 | 0.21 | |
| | May | 58.7 | 58.8 | 0.24 | |
| | June | 58.8 | 56.8 | 0.25 | |
| | July | 79.7 | 56.7 | 0.34 | peak |
| | Aug. | 54.7 | 56.2 | 0.23 | |
| | Sept. | 63.8 | 54.1 | 0.28 | |
| | Oct. | 54.6 | 55.4 | 0.24 | |
| | Nov. | 54.1 | 55.8 | 0.23 | |
| | Dec. | 64.5 | 54.6 | 0.28 | |
| 2011 | Jan. | 77.1 | 61.7 | 0.30 | |
| | Feb. | 69.8 | 54.6 | 0.31 | |
| | March | 94.7 | 61.4 | 0.37 | |
| | April | 119.6 | 65.6 | 0.44 | |
| | May | 433.0 | 84.4 | 1.23 | peak |
| | June | 328.4 | 80.0 | 0.98 | |
| | July | 159.9 | 79.3 | 0.48 | |
| | Aug. | 120.8 | 70.3 | 0.41 | |
| | Sept. | 92.4 | 60.4 | 0.37 | |
| | Oct. | 97.8 | 62.4 | 0.38 | |
| | Nov. | 66.8 | 58.4 | 0.27 | |
| | Dec. | 65.2 | 58.6 | 0.27 | |

# LIME DEMAND TRACKING

| Year | Month | Lime (tons) | KT flow (mg) | Lime Demand (g/L) | |
|---|---|---|---|---|---|
| 2012 | Jan. | 74.9 | 58.4 | 0.31 | |
| | Feb. | 56.8 | 57.7 | 0.24 | |
| | March | 85.6 | 67.2 | 0.31 | |
| | April | 194.8 | 81.2 | 0.57 | |
| | May | 261.6 | 86.8 | 0.72 | peak |
| | June | 179.9 | 83.4 | 0.52 | |
| | July | 140.8 | 74.3 | 0.45 | |
| | Aug. | 118.0 | 68.9 | 0.41 | |
| | Sept. | 95.6 | 62.2 | 0.37 | |
| | Oct. | 89.0 | 60.0 | 0.36 | |
| | Nov. | 73.3 | 57.2 | 0.31 | |
| | Dec. | 74.8 | 61.8 | 0.29 | |
| 2013 | Jan. | 57.2 | 61.9 | 0.22 | |
| | Feb. | 64.5 | 59.4 | 0.26 | |
| | March | 71.7 | 66.2 | 0.26 | |
| | April | 96.9 | 69.6 | 0.33 | |
| | May | 126.2 | 71.5 | 0.42 | peak |
| | June | 94.1 | 64.6 | 0.35 | |
| | July | 91.2 | 62.8 | 0.35 | |
| | Aug. | 89.2 | 58.4 | 0.37 | |
| | Sept. | 65.2 | 58.0 | 0.27 | |
| | Oct. | 59.3 | 58.3 | 0.24 | |
| | Nov. | 50.9 | 56.2 | 0.22 | |
| | Dec. | 49.9 | 56.9 | 0.21 | |
| 2014 | Jan. | 38.7 | 57.4 | 0.16 | |
| | Feb. | 35.8 | 54.6 | 0.16 | |
| | March | 73.1 | 65.3 | 0.27 | |
| | April | 101.1 | 65.6 | 0.37 | |
| | May | 208.3 | 80.6 | 0.62 | peak |
| | June | 127.4 | 65.6 | 0.47 | |
| | July | 87.5 | 63.4 | 0.33 | |
| | Aug. | 81.1 | 61.5 | 0.32 | |
| | Sept. | 63.7 | 56.3 | 0.27 | |
| | Oct. | 53.1 | 60.6 | 0.21 | |
| | Nov. | 62.8 | 55.0 | 0.27 | |
| | Dec. | 54.6 | 59.7 | 0.22 | |
| 2015 | Jan. | 51.7 | 58.4 | 0.21 | |
| | Feb. | 61.0 | 59.7 | 0.24 | |
| | March | 83.1 | 64.4 | 0.31 | |
| | April | 94.8 | 63.0 | 0.36 | peak |
| | May | 73.3 | 62.0 | 0.28 | |
| | June | 69.7 | 65.3 | 0.26 | |
| | July | 83.6 | 55.6 | 0.36 | |
| | Aug. | 58.4 | 55.3 | 0.25 | |
| | Sept. | 55.3 | 53.9 | 0.25 | |
| | Oct. | 56.8 | 52.0 | 0.26 | |
| | Nov. | 46.3 | 49.8 | 0.22 | |
| | Dec. | 43.7 | 51.5 | 0.20 | |
| 2016 | Jan. | 24.2 | 52.2 | 0.11 | |
| | Feb. | 33.4 | 53.6 | 0.15 | |
| | March | 66.0 | 64.0 | 0.25 | |
| | April | 86.1 | 63.3 | 0.33 | |
| | May | 96.9 | 58.1 | 0.40 | peak |
| | June | 69.9 | 53.1 | 0.32 | |
| | July | 68.2 | 56.5 | 0.29 | |
| | Aug. | 53.7 | 53.2 | 0.24 | |
| | Sept. | 53.6 | 49.8 | 0.26 | |
| | Oct. | 49.8 | 52.4 | 0.23 | |
| | Nov. | 48.7 | 53.8 | 0.22 | |
| | Dec. | 48.3 | 52.0 | 0.22 | |
| 2017 | Jan. | 51.7 | 49.3 | 0.25 | |
| | Feb. | 46.9 | 53.7 | 0.21 | |
| | March | 140.0 | 59.0 | 0.57 | |
| | April | 174.5 | 61.9 | 0.68 | |
| | May | 246.6 | 84.2 | 0.70 | peak |
| | June | 143.5 | 73.1 | 0.47 | |
| | July | 141.6 | 69.4 | 0.49 | |
| | Aug. | 87.6 | 58.5 | 0.36 | |
| | Sept. | 100.8 | 67.4 | 0.36 | |

## KELLOGG TUNNEL ZINC DATA

Concentration (mg/L)

| Month | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | | 86 | 81 | 79 | 63 | 70 | 61 | 72 | 57 | 68 | 41 | 46 | 50 | 53 |
| Feb. | | 86 | 91 | 96 | 55 | 72 | 57 | 95 | 58 | 68 | 41 | 68 | 52 | 50 |
| March | | 94 | 116 | 86 | 65 | 68 | 53 | 86 | 58 | 69 | 58 | 81 | 63 | 124 |
| April | | 98 | 121 | 140 | 85 | 80 | 50 | 137 | 176 | 86 | 107 | 92 | 115 | 238 |
| May | | 105 | 231 | 179 | 318 | 136 | 57 | 377 | 215 | 150 | 177 | 87 | 138 | 206 |
| June | | 107 | 182 | 118 | 271 | 143 | 68 | 347 | 164 | 106 | 131 | 78 | 108 | 145 |
| July | | 90 | 144 | 111 | 198 | 117 | 75 | 181 | 136 | 87 | 87 | 75 | 81 | 97 |
| Aug. | | 87 | 112 | 92 | 132 | 94 | 79 | 130 | 110 | 86 | 76 | 66 | 76 | 98 |
| Sept. | | 84 | 107 | 80 | 107 | 76 | 81 | 132 | 107 | 75 | 66 | 63 | 68 | 75 |
| Oct. | 59 | 81 | 100 | 88 | 99 | 75 | 70 | 86 | 70 | 67 | 63 | 54 | 52 | |
| Nov. | 66 | 79 | 88 | 88 | 104 | 63 | 57 | 95 | 71 | 70 | 55 | 44 | 52 | |
| Dec. | 67 | 62 | 78 | 65 | 76 | 59 | 61 | 88 | 69 | 54 | 49 | 55 | 50 | |
| **average** | **64** | **88** | **121** | **102** | **131** | **88** | **64** | **152** | **108** | **82** | **79** | **67** | **75** | **121** |
| | | | | | | | | | | | | | | |
| **lime usage (tons/day)** | | **2.59** | **3.23** | **2.76** | **4.78** | **3.24** | **2.16** | **4.31** | **3.93** | **2.46** | **2.70** | **1.99** | **1.93** | |
| **Zinc Conc. Increase/Decrease** | | | **37%** | **-16%** | **29%** | **-33%** | **-27%** | **138%** | **-29%** | **-24%** | **-4%** | **-15%** | **12%** | |
| **Lime Usage Increase/Decrease** | | | **25%** | **-15%** | **73%** | **-32%** | **-33%** | **100%** | **-9%** | **-37%** | **10%** | **-26%** | **-3%** | |

## KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2000-2009

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Jan.** | 61,000,000 | 61,677,510 | 54,606,100 | 53,066,890 | 52,223,080 | 53,150,000 | 56,050,900 | 56,281,000 | 53,465,820 | 50,936,960 |
| **Feb.** | 57,600,000 | 45,584,000 | 52,840,000 | 46,493,470 | 48,306,920 | 49,860,000 | 51,188,000 | 50,511,300 | 49,282,209 | 48,146,111 |
| **March** | 60,730,000 | 57,740,360 | 50,452,060 | 60,162,290 | 59,852,720 | 58,073,000 | 56,332,830 | 65,443,650 | 54,578,130 | 61,712,540 |
| **April** | 68,680,000 | 54,846,000 | 65,583,230 | 63,335,350 | 50,715,310 | 53,775,350 | 72,039,280 | 66,636,500 | 61,690,530 | 63,055,350 |
| **May** | **97,719,900** | 57,501,901 | 76,082,410 | 63,335,350 | 53,245,000 | 54,181,650 | 72,027,000 | 63,203,308 | 86,680,760 | 70,233,580 |
| **June** | 69,800,000 | 55,835,590 | 67,299,960 | 59,532,434 | 50,451,170 | 51,750,000 | 68,385,600 | 57,981,410 | 82,622,590 | 64,623,180 |
| **July** | 63,698,850 | 53,652,330 | 64,820,120 | 66,252,746 | 56,538,980 | 55,255,000 | 64,054,000 | 58,282,900 | 66,324,500 | 61,535,000 |
| **Aug.** | 66,707,120 | 45,289,000 | 58,212,940 | 62,074,750 | 52,002,140 | 49,970,000 | 64,621,000 | 55,335,900 | 65,168,620 | 56,446,670 |
| **Sept.** | 55,797,530 | 50,276,020 | 60,140,460 | 43,789,000 | 49,208,020 | 49,987,000 | 54,515,270 | 50,471,870 | 61,074,020 | 57,006,430 |
| **Oct.** | 60,424,720 | 50,660,840 | 54,485,871 | 52,869,290 | 59,601,690 | 52,807,000 | 57,610,030 | 50,086,330 | 58,666,300 | 55,830,000 |
| **Nov.** | 53,408,660 | 50,660,840 | 51,072,259 | 47,600,000 | 51,948,000 | 50,722,600 | 55,191,700 | 50,779,040 | 52,041,780 | 54,956,800 |
| **Dec.** | 56,414,870 | 53,464,780 | 56,034,000 | 56,413,080 | 56,770,000 | 54,904,400 | 60,486,900 | 53,716,210 | 55,727,260 | 54,542,700 |
| **Totals** | 771,981,650 | 637,189,171 | 711,629,410 | 674,924,650 | 640,863,030 | 634,436,000 | 732,502,510 | 678,729,418 | 747,322,519 | 699,025,321 |

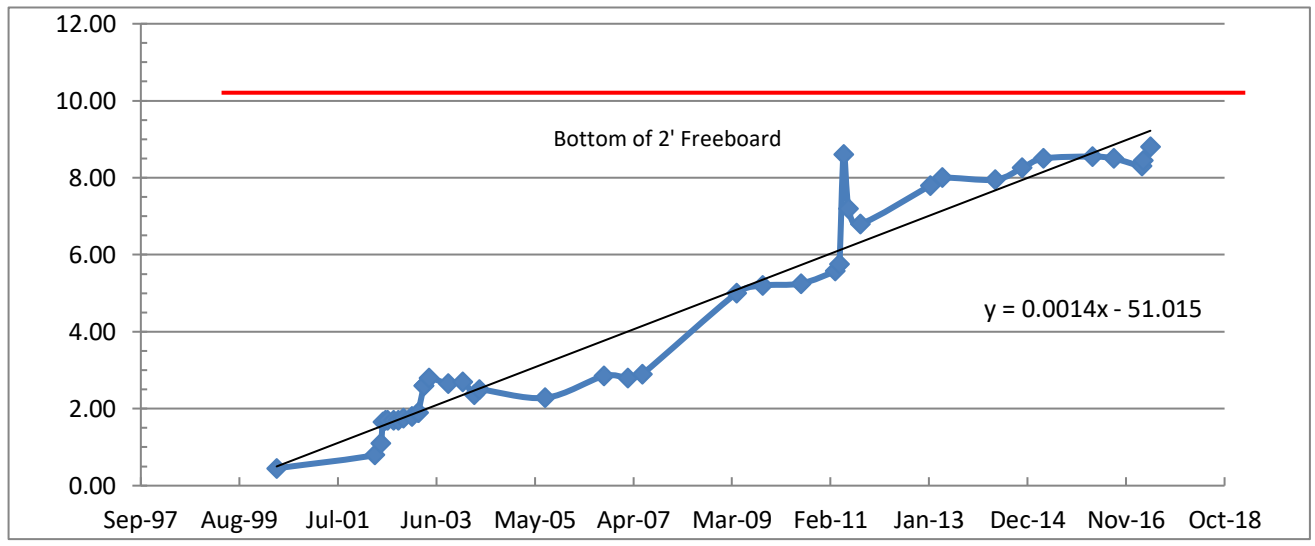
## KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2010-2019

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Jan.** | 55,503,180 | 61,797,170 | 58,434,610 | **61,855,400** | 57,478,450 | 58,440,540 | 52,196,750 | 49,352,650 | | |
| **Feb.** | 50,819,910 | 54,556,227 | 57,763,170 | 59,383,290 | 54,607,950 | **59,767,470** | 53,694,400 | 53,675,440 | | |
| **March** | 54,691,420 | 61,373,630 | **67,236,650** | 66,264,780 | 65,396,350 | 64,468,230 | 63,967,920 | 58,977,410 | | |
| **April** | 56,255,340 | 65,687,340 | **81,233,630** | 69,619,100 | 65,618,770 | 63,056,840 | 63,323,620 | 61,947,620 | | |
| **May** | 58,825,640 | 84,365,390 | **86,826,340** | 71,496,380 | 80,598,590 | 61,898,200 | 58,147,240 | 84,208,690 | | |
| **June** | 56,770,200 | 79,985,540 | **83,440,990** | 64,663,900 | 65,623,330 | 56,368,540 | 53,149,810 | 73,144,700 | | |
| **July** | 56,727,510 | **79,346,330** | 74,315,690 | 62,844,790 | 63,425,030 | 55,655,000 | 56,521,710 | 69,470,550 | | |
| **Aug.** | 56,239,370 | **70,377,570** | 68,986,900 | 58,459,380 | 61,486,270 | 55,316,100 | 53,293,430 | 58,550,600 | | |
| **Sept.** | 54,109,980 | 60,404,280 | **62,270,300** | 58,097,500 | 56,279,590 | 53,890,000 | 49,796,420 | 67,447,510 | | |
| **Oct.** | 55,480,200 | **62,403,480** | 59,991,850 | 58,325,780 | 60,659,850 | 52,082,800 | 52,417,120 | | | |
| **Nov.** | 54,856,880 | **58,430,700** | 57,184,220 | 56,215,000 | 55,065,100 | 49,812,540 | 53,815,710 | | | |
| **Dec.** | 54,607,330 | 58,617,700 | **61,750,390** | 56,932,530 | 59,770,540 | 51,521,900 | 52,063,110 | | | |
| **Totals** | 664,886,960 | 797,345,357 | **819,434,740** | **744,157,830** | **746,009,820** | **682,278,160** | **662,387,240** | **576,775,170** | **0** | **0** |

Yellow indicates record monthly flow as well as record annual flow

# Bunker Hill Sludge Pond
## Sludge Staff Gauge Reading Summary

| Date | Sludge Level (feet) | Estimated Sludge Elevation | Estimated Remaining Height to Road (feet) |
|---|---|---|---|
| 05/19/00 | 0.45 | | |
| 04/16/02 | 0.80 | | |
| 05/28/02 | 1.10 | | |
| 06/13/02 | 1.65 | | |
| 07/01/02 | 1.70 | | |
| 07/16/02 | 1.70 | | |
| 08/27/02 | 1.70 | | |
| 10/01/02 | 1.70 | | |
| 11/06/02 | 1.75 | | |
| 01/06/03 | 1.80 | | |
| 02/19/03 | 1.90 | | |
| 02/19/03 | 1.90 | | |
| 03/31/03 | 2.60 | | |
| 04/01/03 | 2.60 | | |
| 05/07/03 | 2.80 | | |
| 09/19/03 | 2.65 | | |
| 01/01/04 | 2.70 | | |
| 03/22/04 | 2.36 | | |
| 04/29/04 | 2.50 | 2311 | 11.0 |
| 08/09/05 | 2.28 | 2310.8 | 11.2 |
| 09/30/06 | 2.85 | 2311.4 | 10.7 |
| 03/20/07 | 2.80 | 2311.3 | 10.7 |
| 6/30/2007 | 2.90 | 2311.4 | 10.6 |
| 4/30/2009 | 5.00 | 2313.5 | 8.50 |
| 10/31/2009 | 5.20 | 2313.7 | 8.30 |
| 7/31/2010 | 5.25 | 2313.8 | 8.25 |
| 3/31/2011 | 5.58 | 2314.1 | 7.92 |
| 4/30/2011 | 5.75 | 2314.3 | 7.75 |
| 5/30/2011 | 8.60 | 2317.1 | 4.90 |
| 7/5/2011 | 7.20 | 2315.7 | 6.30 |
| 9/26/2011 | 6.80 | 2315.3 | 6.70 |
| 2/4/2013 | 7.80 | 2316.3 | 5.70 |
| 4/30/2013 | 8.00 | 2316.5 | 5.50 |
| 5/12/2014 | 7.95 | 2316.5 | 5.55 |
| 11/20/2014 | 8.26 | 2316.8 | 5.24 |
| 4/20/2015 | 8.50 | 2317.0 | 5.00 |
| 4/1/2016 | 8.55 | 2317.1 | 4.95 |
| 9/1/2016 | 8.50 | 2317.0 | 5.00 |
| 3/20/2017 | 8.30 | 2316.8 | 5.20 |
| 3/28/2017 | 8.45 | 2317.0 | 5.05 |
| 5/18/2017 | 8.80 | 2317.3 | 4.70 |
| 7/31/2017 | 8.75 | 2317.3 | 4.75 |




| | | |
|---|---|---|
| **6282** | **8.30** | **Total Change, Days and Feet** |
| Note 3 | 0.48 | Average Rise Per Year (Includes Lined Pond Cleanout), feet |
| | 4.75 | Estimated average remaining total height to perimeter road, feet |
| | 2.0 | Assumed desired end-of-life freeboard, feet |
| | 2.8 | Estimated available storage height, feet |
| | **5.7** | **Estimated Remaining Life (years)** |
| | 1/28/2023 | |

Notes:

1) Pond perimeter road centerline elevation = 2322.0 feet from CIA as-builts Drawing C-28

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: September 07, 2017 Inspected By: Gary Coast, Steve Brunner

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting Ok |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris & grass clippings were removed |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.73 mgd (1895 gpm), pH at this time is 2.85

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Wood debris was removed from the mine discharge flume during this cleaning event

No discussions occurred with any mine personnel.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: September 14, 2017 Inspected By: Gary Coast, Steve Brunner

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris was removed from both racks |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.73 mgd (1895 gpm), pH at this time is 2.90.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Several pieces of wood debris were removed from both trash racks.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: September 21, 2017 Inspected By: Gary Fulton, Steve Brunner

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris was removed |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.61 mgd (1812 gpm), pH at this time is 3.18.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Wood debris removed from the mine discharge flume during this cleaning event.

No discussions occurred with any of the mine personnel.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: September 28, 2017 Inspected By: Gary Coast, Steve Brunner

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | 100 gallons of sediment collected<br>Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | No debris ok |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.60 mgd (1805 gpm), pH at this time is 3.00.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Wood debris removed from the mine discharge flume during this cleaning event.

No discussions occurred with any of the mine personnel.